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IDEAS AND TECHNICAL INNOVATIONS

Reconstruction with fascia lata allograft of the posterior vertebra elements after resection for aneurysmal bone cyst in a child

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Abstract We report a case of ABC in a child where, after resection of the posterior spinal column of L1, we did a biological reconstruction using a posterior tension band with a segment of fascia lata allograft in tension between T12 and L2. After the long term follow up, X-ray and MRI controls showed a satisfactory alignment of the spine and no local recurrence. The patient now has no sign of spinal instability or deviation, with no kind of discomfort or pain, and has a normal life. In our experience this biological tension band interferes minimally with the growth of the spine, and has a less number of complications in comparison with other more aggressive methods and so is a good option for restoring the stability in young patients with benign spinal tumors that arises on the posterior column without having any kind of potential deviations.

Keywords Aneurysmal bone cyst · Curettage · Fascia lata allograft · Posterior tension band

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Introduction

The term aneurismal bone cyst (ABC) was used for the first time by Jaffe and Lichtenstein [14] in 1940.

The cause of this lesion is still unknown [11]. What is known is that this peculiar and rare lesion represents 1.4% of the primary bone tumours; and the vertebral column is involved in 10–20% of cases; the lumbar spine is the most frequent segment compromised, accounting for 45%, cervical spine 30% and thoracic spine 25% [10].

In the vertebrae the lesion usually involves the posterior elements and it more rarely appears in the vertebral body. In this particular location, the ABC must be distinguished from other different tumours, such as the giant cell tumour, osteoblastoma, and telangiectatic osteosarcoma [10, 11, 14].

The goal of treatment differs if this tumour arises on a vertebral body or in the metaphysis of the tubular bones, because there are special considerations when the ABC appears in the spine: the proximity to vital structures, such as the spinal cord, or important vessels or nerve roots. The

type of surgical approach and the necessity to remove the entire lesion to avoid the possibility of recurrence is very likely to result in postoperative spinal instability [1, 2, 4, 13].

Considering that this tumour usually appears in the posterior spinal column (in zones 3–10 of the Weinstein, Boriani, Biagini, WBB classification), in most cases it is necessary to perform only a posterior approach, which may compromise the various structures responsible for the posterior spinal stability, such as the inter and supra-spinatus ligaments, the ligamentum-flavum, the posterior longitudinal ligament [3, 5, 6].

Nowadays, treatment usually consists of selective arterial embolization or intralesional alcohol injection, but if the lesion is large or compresses the spinal cord or nerve roots, surgical resection by complete curettage and bone grafting is also necessary [12, 16]. Then, in most cases stabilization with osteosinthesis is usually performed [15]. Nevertheless, in young patients it is important to preserve the alignment of the spine and permit harmonious development until the end of the growth [7–9].

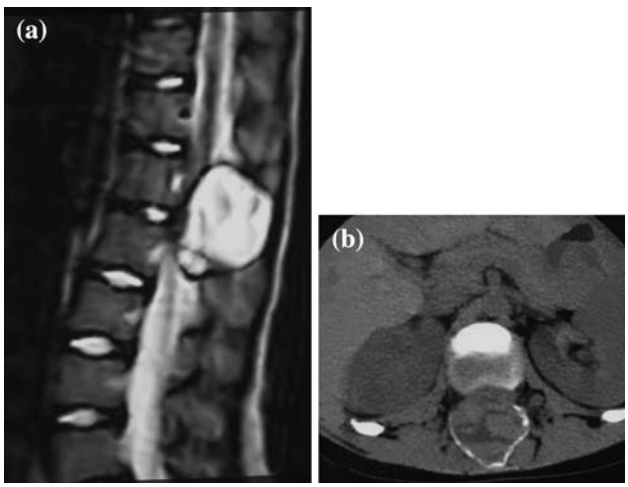

Fig. 1 **a** Sagittal-sectional MRI, T2 weighted image, shows a large ABC of L1. The fluid levels are present through the cyst. **b** Axial CT scan for bone shows an ABC of the posterior elements of L1 vertebra. Note the thin cortical rim surronding the lesion and the compression of the spinal cord

Case report

We report a case of ABC where, after resection of the posterior spinal column of L1, a biological reconstruction was performed using a posterior tension band with a segment of fascia lata graft in tension between T12 and L2.

The patient, a 7-year-old girl presented at the 5th Ward of the Orthopaedic Rizzoli Institute because of lumbar pain which had started 7 months earlier, and had started to augment approximately 1 month earlier. The week before presentation, the pain had irradiated to the lower limbs.

The patient underwent X-ray examination, and severe osteolysis of the posterior arch of L1 was found. Also a computed tomography image (CT), magnetic resonance image (MRI) and bone scan were performed (Fig. 1a, b). Then, a tissue sample was taken with a needle-biopsy-technique guided by CT scan; the histopathological diagnosis was ABC.

We decided to perform curettage using a posterior approach (Fig. 2a, b). After intralesional excision, we observed instability of the spine (D12-L2), and so performed a biological reconstruction using a posterior tension band. We used a fascia lata allograft from our Musculoskeletal Tissue Bank. This strip was 2 cm wide and 15 cm long, and was passed under the supra-spinatus ligaments and the posterior bone elements on D12 and L2, and then fixed with a suture (Fig. 3a, b). Afterwards, the wound was closed in the usual surgical fashion.

The final diagnosis of ABC was confirmed after resection of the neoplasm.

During reconstruction of the posterior ligaments, instability was observed, so we recommended that the patient wear a corset for a period of 3 months. During the immediate post-operative exams no complications were observed.

At follow up X-rays showed a satisfactory alignment of the spine, no significant change in kyphosis and no local recurrence (Fig. 4a, b).

At 24 months' follow-up the MRI showed the result of the resection of the posterior spinal column of L1, and the biological reconstruction using fascia lata allograft (Fig. 5a, b).

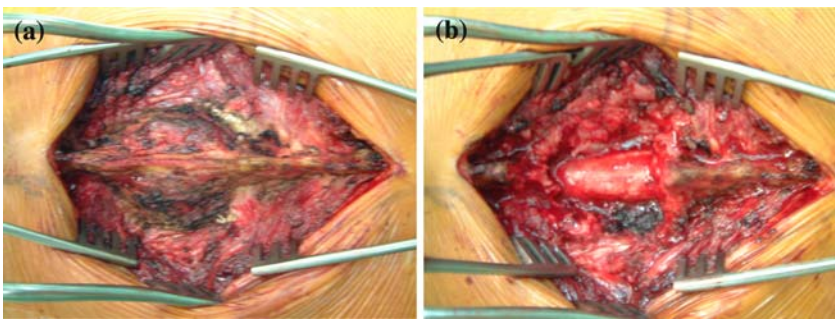

Fig. 2 In the intraoperative photography you can see: **a** ABC after laminectomy and before the curettage. **b** Exposition of the spinal cord after curettage of the ABC and resection of the posterior arch of L1

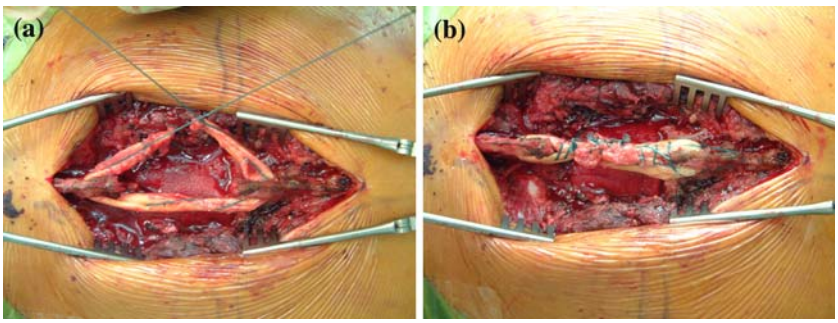

Fig. 3 **a** The fascia lata passing under the posterior elements of L2 and T12. **b** The final result of the biological reconstruction with posterior tension band

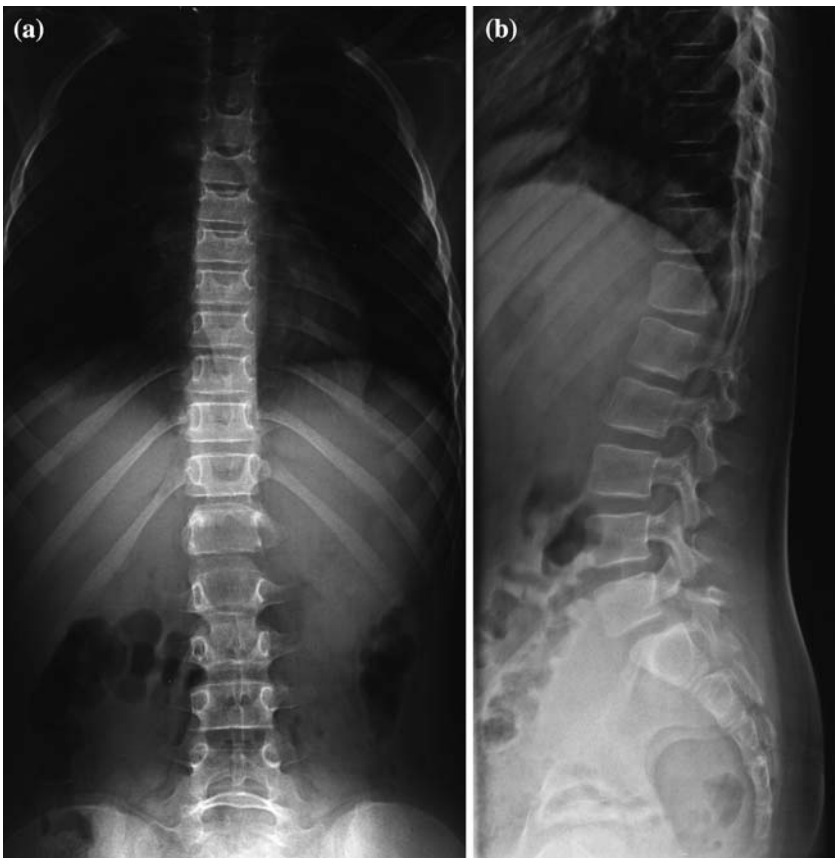

Fig. 4 Anteroposterior (**a**) and anterolateral (**b**) radiograph in a standing position show the correct alignment of the spine 4 years after the surgery

After 4 years the patient has no sign of spinal instability or deviation and no discomfort or pain, and is now leading a normal life.

Discussion

In our case, which was treated by posterior approach, we did not plan any classical stabilization because we think that wearing a dorsal-lumbar corset for 3 months can offer enough stability after a resection at lumbar levels. Various types of long-term complications are well known to occur after a laminectomy is performed; the most important ones are kyphosis and kyphos-scoliosis. These secondary deviations mainly develop after performing laminectomy on multiple levels and most frequently on the cervical-thoracic spine [15, 17]. The incidence of this late kind of complication may appear with a very low rate on the lumbar spine. If during the follow-up this type of complication had appeared, our choice would have been to stabilize the spine using transpedicular screws and bone allograft. This kind of fixation has many different types of complications [7–9, 13, 15].

To avoid these late complications, during preoperative planning we thought of reconstructing the posterior ligaments by using a fascia lata allograft from our tissue bank.

Fig. 5 Axial (**a**) and sagittal-sectional (**b**) MRI, T1 weighted images, show the biological reconstruction and no local recurrence

This strip passes over the supraspinous ligaments, one level above and one below, to reconstruct the posterior complex.

The biological posterior tension band was chosen above other bone fixation methods because it interferes minimally with the growth of the spine, and carries a lower risk of complications in comparison with other more aggressive methods.

Conclusion

This case shows that during the immediate period stability using a biological tension band as a stabilization method is not as good as classic bone fixation, but mid- and long-term results are very good, and complications are less severe. Above all it is a biological system that assimilated satisfactorily, as seen by the MRI follow-up exam.

In our experience this biological tension band system is a good option for restoring the stability in young patients with benign spinal tumours that arise on the posterior column, and is the only elastic stabilizing system that can expand during growth without producing any deviations. Furthermore, with this kind of reconstruction, the oncologic follow-up is easier in comparison with the classic bone fixation, which is difficult to examine by MRI due to interference with metal implants.

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